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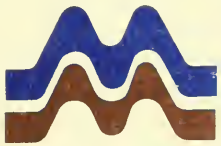

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1. SUMMARY

A wide variety of factors influence the value of a parcel of land -- whether residential, industrial/commercial, agricultural or undeveloped. Numerous researchers have hypothesized that energy resource development, in the form of coal mines, electrical generating plants, and energy transportation facilities, significantly affect the market value of adjacent or proximate land.

This paper briefly reviews the arguments and evidence regarding the general affects of energy projects on land values. It further addresses the implications of the research findings for land value affects from the proposed Decker area mine projects. Limited time and resources prevent an in-depth study and presentation of the relevant research issues. However, the interested reader, can pursue the issues raised through referral to citations in the bibliography.

Changes in land values due to energy resource development projects could occur in two ways:

1) The actual or anticipated highest and best use of the land is changed from one category such as agriculture to another such as mining.

2) The value of the land is changed, although its present highest and best use is not.

A multitude of causal factors could operate directly or indirectly to produce either type of change. For example, if a by-product of the energy development is rapid population growth, demand for residential land would be likely to exceed supply -- at least in certain categories and for a period of time. The literature is relatively conclusive (in a qualitative sense) on the subject of growth-related land value effects. As the supply of developable land is surpassed by the demands of a growing and wealthier population, the market value of appropriately located land parcels will be bid up. Similarly, the purchase price of the surface and mineral rights to land in the particular project area will generally be higher due to the greater anticipated net income under energy

development than under its present use. In contrast to these obvious positive effects, the evidence that has been assembled documenting adverse effects on land values is inconclusive. In fact, the literature addressing potential adverse effects is contradictory.

There are diverse implications of current research findings for land value effects due to the proposed Decker area mines. First, land with exploitable mineral rights would likely experience an increase in value, depending upon the location and quality of the subsurface reserves as well as upon the ownership status of the mineral rights. Second, residential, commercial, and industrial land in areas of high population growth, such as Sheridan, will experience an increase in land value, although the literature does not provide an acceptable method for estimating the probable amount of the increase. Third, based on present information, one cannot predict the likely land value effects due to the proposed Decker projects on adjacent parcels of land. The general literature on such parcels in rural areas is thin and inconclusive. Furthermore, there is little information and no published research on land transactions in the Decker area. Finally, the Decker area projects would have only minimal population effects in Big Horn County. Thus, outside of the mine sites and their immediate environs, no land value effects can be predicted.

2. ANALYTIC FRAMEWORK

This section outlines the framework used to identify potential effects on land value of the proposed Decker area mines. The basic approach was to identify the factors which influence the value of land, in both rural and urban settings, and compare them with the characteristics of the Decker area projects as well as with their other socioeconomic consequences. To begin, however, one must define the concept of land value to be used.

2.1 Land Value

The concept of land value used in this paper is basically the market price of land at an energy development project site, adjacent to it, and in the surrounding area, including especially the nearby communities that are likely to experience the major share of the project's population and economic effects. This concept is consistent with established law regarding just compensation for properties taken or otherwise directly affected by a public project, such as an electric transmission line. In this context, the effect of an action or project on a particular parcel of land is defined as the difference between "fair market value" before and after the action. Fair market value is defined as the amount in cash, or in terms reasonably equivalent to cash, for which in all probability the property would be sold by the knowledgeable owner willing but not obligated to sell to a knowledgeable purchaser who desires but is not obligated to buy. (Interagency Land Acquisiton Conference 1971).

There are four principal methods of estimating fair market value (Mountain West Research, Inc. 1981). The two most frequently used of these methods rely on the sale price of similar parcels of land. In rural areas of Montana and Wyoming, the frequency of such sales is typically very low. For such areas, the number of sale observations is too limited to enable conclusions to be drawn regarding the impact of an

energy development on the fair market value of nearby properties, unless a similar highest and best use is anticipated.

In economic terms, the price of land should be equal to the present value of its marginal product, capitalized over time. (Doll and Orazem 1978). In other words, this is the value of the future annual stream of net income discounted to the present. This concept is appropriate to agricultural land where real and expected net income from parcels have been major determinants of price. (Wiedrich 1982)

2.2 Characteristics of Energy Development That May Influence Land Values

Energy development such as the proposed Decker area mines exhibit a variety of characteristics that may affect values. These characteristics include the following:

1) Exploitation of mineral reserves with the attendant potential for similar resource extraction on other properties in the area (realization of this potential amounts to a change in highest and best use and is a function of the anticipated net income from extraction of the mineral resource).

2) Generation of population growth with consequent increases in demand for residential, commercial and related institutional land -- particularly, in and around urban areas (this increase in demand may simply drive up the value of existing highest and best uses or it may create the opportunity for a new highest and best use -- as in the residential subdivision of agricultural land).

3) Development of roads, rail spurs and other infrastructure changing access to land parcels (increasing the opportunity for more intensive land uses and, consequently, higher values).

4) Visual intrusiveness, water requirements, increased air pollution, and increased trespass (such characteristics could lower land values for present uses or reduce opportunities for more productive land uses).

In attempting to relate energy development to agricultural land prices, Wiedrich evaluated five other variables:

1) Percent of oil rights transacted,

2) Percent of coal rights transacted,

3) Miles to proposed energy production site,

4) Miles to a lignite reserve, and

5) Miles to an oil well or lignite mine (Wiedrich 1983).

Similar detail is found in studies attempting to isolate the effects on land value of such diverse causal agents as air pollution, transmission lines, solid waste dumps, highways, power plants, and earthquake threat.

2.3 Factors That Influence Land Value

The characteristics of energy projects that may cause changes in land values are generally not the primary determinants of value. A diverse set of factors influence the value of a particular parcel of land. Energy development may act on some of these factors to produce changes in land value. The relevant factors to be considered are:

1) The supply and demand for properties with similar characteristics and potential uses

2) Conformity of proposed land use with uses on adjacent or neighboring properties and with relevant local zoning regulations

3) The physical characteristics of the parcel and its potential as a location for different types and sizes of improvements

4) General economic conditions, including inflation and the supply and cost of money

5) Productivity, including improvements, amenity qualities and income potential

6) Arrangements regarding the ownership of development, surface, mineral, and other rights

7) Accessibility

Obviously, the significant determinants of value will vary by type of current land use, highest and best use, and location. Within the Decker mines area, these factors are operative for a wide variety of land uses, including residential, commercial, industrial, mining, agricultural, and recreational. The variability of influences by type of use is exemplified by Wiedrich's study of agricultural land prices and energy development where the following determinants were identified:

1) Monetary inflation
2) Interest rates
3) Percent of purchase price as downpayment
4) Distance to market centers
5) Road quality
6) Farm enlargement
7) Improvements - buildings
8) Land productivity
9) Size of farm operation and parcel purchased

(Wiedrich 1982.)

Comparing the proposed Decker area projects to this specific list, a potential for effect on distance to market centers, road quality and land productivity might exist. Referring to the broader list of factors cited at the beginning of this section, it is clear that the Decker projects might affect the supply and demand for land, conformity with adjacent or nearby land uses, productivity (including amenity qualities and income potential), and accessibility. These factors will form the basis for the review of research findings presented in Chapter 3.

3. RESEARCH FINDINGS

Although a vast amount of research has been carried out on the general subject of land values, very little has addressed relationships between energy development and land values. This chapter briefly reviews the findings reported in selected research reports. These reports are either of a general nature, covering a range of potential land value relationships, or focused on particular factors. In this latter group, the monograph addresses those covering the land value determinants relevant to the Decker area mines -- i.e. those listed at the end of Chapter 2.

3.1 General Research

Several research efforts have sought to define and, in some instances, quantify the effects of particular types of energy development on land values. The key studies and findings are briefly reviewed below.

Mountain West Research carried out a critical review of research addressing the land value effects of electric transmission lines (Mountain West Research, Inc. 1981). The topic is generally appropriate to linear land uses where land acquisition by condemnation is an issue. It also represents a class of developments where aesthetic effects are present, such as visual intrusion and perceived adverse consequences on health. This study found the evidence on land value effects to be inconclusive. While the more recent and better designed research tends to show an adverse impact on residential land values that decayed sharply with distance away from the transmission line, the findings are inconsistent in terms of the magnitude of the effect. Moreover, no relationships appropriate to various types of rural land were identified.

Bradley and his collegues evaluated the impact of coal and related energy development on farmers and ranchers in Wyoming's Powder River Basin. (Bradley et al. 1979). The study found that the major effect

on land values occurred through conversion of ranch land to higher value uses (i.e. value was increased through a change in the highest and best use). Bradley's research showed that over 80 percent of affected land owners considered higher land prices and/or royalty income as primary benefits of energy development.

Studies of major electric generating facilities have produced conflicting results regarding land value effects. In examining the socio-economic impacts of power plant construction and operation, Bloomquist concluded that the coal fired plant under study had an adverse impact on property values up to two miles away (Bloomquist 1979). Jack Faucett Associates also concluded adverse impacts on land values from a power plant in Maryland (Jack Faucett Associates 1976). Both studies quantified the magnitude of the effect and sought to identify the share attributable to aesthetic factors such as visual intrusion, odor, and noise. In contrast to these findings, a study of four nuclear power plants in the northeastern U.S. found no adverse effect on the prices of single-family housing within 15 miles of the plants. (Gamble et al. 1979).

Wiedrich's study is the only one identified that has sought to determine a quantitative relationship between agricultural land values and surface coal mining. Wiedrich found that most of the energy-related variables used (see Section 2.2, above) were not significant influences on land prices. "The percent of oil and coal rights purchased, miles to a lignite mine or producing well, miles to a coal conversion facility and miles to a planned lignite mine did not affect the sale price of farmland at highly significant statistical levels..." (Wiedrich 1982, p. 65). The only energy variables that did explain price variability at significant statistical levels were the release date of an existing oil lease and the distance to a coal reserve. The latter variable had an inexplicable positive relationship of about $1.70/acre per mile from the reserve. (Wiedrich 1982.)

3.2 Specific Research

The Bradley and Wiedrich studies cited above address mining effects on land values. Other studies have been directed at supply and demand effects, productivity effects, and accessibility effects. None have been identified that address compatibility of adjacent or nearby uses.

The relationship between the supply and demand for land and its market price is a fundamental tenant of economic theory. Energy development, through localized population and economic growth will primarily affect the demand side of the relationship -- particularly in the West where the availability of agricultural land is often not significantly affected by energy development. A large number of texts and papers deal with the price relationship of the supply and demand for land. Examples include Barlowe (1972), Hurlbert (1958), and Hoover (1948). In addition, a variety of references deal with the impact of economic development or industrialization on rural land prices (Schuh and Scharlach 1966, Herdt and Cochrane 1966).

Productivity effects on land values have also been widely studied. Such effects can be separated into direct and indirect (externality) categories. In the former category are effects on the quality of land and other inputs required for production (e.g., water). In the latter category fall air pollution, aesthetic (noise, odor, etc.) and other externalities of development. Direct land productivity effects of concern are those associated with disturbance and reclamation due to the mining process, as well as changes in the highest and best use of the land. Schuh and Scharlach (1966), Blase and Heseman (1973), and Hammill (1969) have established relationships between agricultural land prices and productivity. In addition, research has been conducted and is currently underway regarding the productivity of reclaimed mine lands. Such research is beyond the scope of this monograph, since it has not included a correlation with agricultural land values. Finally, increased value due to changes in the highest and best use (i.e., productivity increases) of land parcels were verified by Bradley (1979) and Schuh (1966).

Air pollution and externalities (as a group) have received a great deal of attention in the research literature. Appropriate reviews that touch on the issue of potential effects on land value include Polinsky (1974), Freeman (1971), Jack Faucett (1976), Coombes and Biswas (1972), and Lin (1976). Findings confirming the adverse impact of air pollution on land values have not been conclusive, although research on areas downwind from power plants and solid waste dumps generally point in that direction. No relevant similar research for surface coal mines has been identified.

Finally, the type and quality of access to land parcels has been confirmed as an important determinant of land value. This has been demonstrated for rural lands (Edwards 1964) as well as in urban areas (Thompson 1965). Land values increase inversely with the distance to market centers, jobs, and retail centers and directly with the quality of the transportation link providing access. The Decker area mines will provide or induce road and rail improvements, thus increasing access to rural land parcels in the project area. Depending upon the demand for such parcels, better access may bring higher market values.

4. CONCLUSIONS REGARDING LAND VALUE EFFECTS OF THE DECKER AREA MINES

The possible land value effects of surface coal mines, such as those proposed in the Decker area have been examined in only two studies (Bradley 1979 and Wiedrich 1982). In both studies, effects on the value of agricultural land were identified. Bradley found the perception of increased value for ranch land, due to mining and related development, to be a beneficial impact for over 80 percent of the respondents. In the Decker area similar impacts would be likely as the anticipated highest and best use of the land is changed from agriculture to mining. However, it is estimated that only a very small number of land transactions have occurred in the Decker area since 1975 (Taylor, personal communication, April 1983), making the confirmation of this hypothesis for recent coal development virtually impossible. Moreover, as Bradley did not quantify his land value findings, it is not possible to estimate possible levels of increase in values from his work. In addition, some Decker area land owners perceive potential adverse effects on agricultural productivity and land value due to a decrease in the quantity and quality of water -- changes that have not been confirmed -- as well as to a decrease in the aesthetic qualities of the local environment.

The Wiedrich study does not provide indicators of impact on agricultural land values due to coal development that could be applied to the Decker case. The findings generally showed no signficiant relationship between mining and land value.

To the extent that population and economic growth due to the Decker area mines generate changes in the relationship between the demand and supply of residential and commercial land, increases in value will result. This would be particularly likely in the Sheridan urban area under the cumulative (high growth) scenario. Besides increasing the value of land without changing its highest and best use, such project-induced growth could also lead to the conversion of land presently under

agricultural to higher value residential, commercial or industrial uses. Such impacts would not be expected to occur in Big Horn County, unless severance tax revenues were accorded the Crow Tribe and the consequent income effects enabled the purchase of land currently owned by non-Indians in volumes that generated price inflation.

Land productivity reductions due to pollution and adverse aesthetic effects might occur in the immediate vicinity of the proposed mines. However, the literature leads one neither to a basis for concluding that such effects would be large enough to reduce land values, nor to a method of estimating by how much value would be lowered.

Finally, access to lands around the mine sites and between Lodge Grass and the Youngs Creek Mine would be improved through the construction and upgrading of roads. Due to the relatively low demand and productivity (for nonmining uses) of such lands, any resultant increases in land value due to improved access would likely be marginal. Acting in the opposite direction would be the nuisances that increased access would bring (i.e., more trespass, noise, and accident potential).

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